# A T T A C H M E N T   C

## QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

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# QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

## A. Quality Control Program

Develop and implement a quality control program for the continuous emission monitoring systems and their components. As a minimum, include in each quality control program a written plan that describes in detail complete, step-by-step procedures and operations for each of the following activities:

1. Calibration Error Test Procedures

   Identify calibration error test procedures specific to the CEMS that may require variance from the procedures used during certification (for example, how the gases are to be injected, adjustments of flow rates and pressures, introduction of reference values, length of time for injection of calibration gases, steps for obtaining calibration error, determination of interferences, and when calibration adjustments should be made).

2. Calibration and Linearity Adjustments

   Explain how each component of the CEMS will be adjusted to provide correct responses to calibration gases, reference values, and/or indications of interference both initially and after repairs or corrective action. Identify equations, conversion factors, assumed moisture content, and other factors affecting calibration of each CEMS.

3. Preventative Maintenance

   Keep a written record of procedures, necessary to maintain the CEMS in proper operating condition and a schedule for those procedures.

4. Audit Procedures

   Keep copies of written reports received from testing firms/laboratories of procedures and details specific to the installed CEMS that were to be used by the testing firms/laboratories for relative accuracy test audits, such as sampling and analysis methods. The testing firms/laboratories shall have received approval from the District by going through the District's laboratory approval program.

5. Record Keeping Procedures

   Keep a written record describing procedures that will be used to implement the record keeping and reporting requirements.

Specific provisions of Section A-3 and A-5 above of the quality control programs shall constitute specific guidelines for facility personnel. However facilities shall be required to take reasonable steps to monitor and assure implementation of such specific guidelines. Such reasonable steps may include periodic audits, issuance of periodic reminders, implementing training classes, discipline of employees as necessary, and other appropriate measures. Steps that a facility commits to take to monitor and assure implementation of the specific guidelines shall be set forth in the written plan and shall be the only elements of Section A-3 and A-5 that constitute enforceable requirements under the written plan, unless other program provisions are independently enforceable pursuant to other requirements of the $NO_X$ protocols or District or federal rules or regulations.

## B. FREQUENCY OF TESTING

The frequency at which each quality assurance test must be performed is as follows:

1. Daily Assessments

   For each monitor or CEMS, perform the following assessments on each day during which the unit combusts any fuel or processes any material (hereafter referred to as a "unit operating day"), or for a monitor or a CEMS on a bypass stack/duct, on each day during which emissions pass through the bypass stack or duct. These requirements are effective as of the date when the monitor or CEMS completes certification testing.

   a. Calibration Error Testing Requirements for Pollutant Concentration Monitors and $O_2$ Monitors

      Test, record, and compute the calibration error of each $NO_x$ pollutant concentration monitor and $O_2$ monitor at least once on each unit operating day, or for monitors or monitoring systems on bypass stacks/ducts on each day that emissions pass through the bypass stack or duct. Conduct calibration error checks, to the extent practicable, approximately 24 hours apart. Perform the daily calibration error test according to the procedure in Paragraph B.1.a.ii. of this Attachment.

For units with more than one span range, perform the daily calibration error test on each scale that has been used since the last calibration error test. For example, if the emissions concentration has not exceeded the low-scale span range since the previous calendar day, the calibration error test may be performed on the low-scale only. If, however, the emissions concentration has exceeded the low-scale span range since the previous calibration error test, perform the calibration error test on both the low- and high-scales

i. Design Requirements for Calibration Error Testing of $NO_x$ Concentration Monitors and $O_2$ Monitors

Design and equip each $NO_x$ concentration monitor and $O_2$ monitor with a calibration gas injection port that allows a check of the entire measurement system when calibration gases are introduced. For extractive and dilution type monitors, all monitoring components exposed to the sample gas, (for example, sample lines, filters, scrubbers, conditioners, and as much of the probe as practical) are included in the measurement system. For in situ type monitors, the calibration must check against the injected gas for the performance of all electronic and optical components (for example, transmitter, receiver, analyzer).

Design and equip each pollutant concentration monitor and $O_2$ monitor to allow daily determinations of calibration error (positive or negative) at the zero-level (0 to 20 percent of each span range) and high-level (80 to 100 percent of each span range) concentrations.

ii. Calibration Error Test for $NO_x$ Concentration Monitors and $O_2$ Monitors

Measure the calibration error of each $NO_x$ concentration analyzer and $O_2$ monitor once each day according to the following procedures:

If any manual or automatic adjustments to the monitor settings are made, conduct the calibration error test in a way that the magnitude of the adjustments can be determined and recorded.

Perform calibration error tests at two concentrations: (1) zero-level and (2) high level. Zero level is 0 to 20 percent of each span range, and high level is 80 to 100 percent of each span range. Use only NIST/EPA-approved certified reference material, standard reference material, or Protocol 1 calibration gases certified by the vendor to be within 2 percent of the label value.

Introduce the calibration gas at the gas injection port as specified above. Operate each monitor in its normal sampling mode. For extractive and dilution type monitors, pass the audit gas through all filters, scrubbers, conditioners, and other monitor components used during normal sampling and through as much of the sampling probe as practical. For in situ type monitors, perform calibration checking all active electronic and optical components, including the transmitter, receiver, and analyzer. Challenge the $NO_x$ concentration monitors and the $O_2$ monitors once with each gas. Record the monitor response from the data acquisition and handling system. Use the following equation to determine the calibration error at each concentration once each day:

$$CE = \frac{|R-A|}{S} \times 100 \qquad \text{(Eq. C-1)}$$

Where,

CE = The percentage calibration error based on the span range

R = The reference value of zero- or high-level calibration gas introduced into the monitoring system.

A = The actual monitoring system response to the calibration gas.

S = The span range of the instrument

b. Calibration Error Testing Requirements for Flow Monitors

Test, compute, and record the calibration error of each flow monitor at least once each unit operating day or for monitors or monitoring systems on bypass stacks/ducts, on each ~~day~~ that emissions pass the bypass stack or duct. Introduce the reference value~~s~~ to the probe tip (or equivalent) or to the transducer . The reference values must have at least two reference values: (1) zero to 20 percent of span range or an equivalent reference value (for example, pressure pulse or electronic signal), and (2) 50 to 70 percent of span range or an equivalent reference value. Record flow monitor output from the data acquisition and handling systems before and after any adjustments. Calculate the calibration error using the following equation :

$$CE = \frac{|R - A|}{S} \times 100 \qquad \text{(Eq. C-2)}$$

Where:

CE = Percentage calibration error based on the span range

R = Reference value of zero or high level calibration gas introduced into the monitoring system

A = Actual monitoring system response.to the calibration gas.

S = Span range of the flow monitor.

c. Interference Check

Perform the daily flow monitor interference checks specified in Paragraph B.1.c.i. of this Attachment at least once per operating day (when the unit(s) operate for any part of the day).

i. Design Requirements for Flow Monitor Interference Checks

Design and equip each flow monitor with a means to ensure that the moisture expected to occur at the monitoring location does not interfere with the proper functioning of the flow monitoring system. Design and equip each flow monitor with a means to detect, on at least a daily basis, pluggage of each sample line and sensing port, and malfunction of each resistance temperature detector (RTD), transceiver, or equivalent.

Design and equip each differential pressure flow monitor to provide (1) an automatic, periodic backpurging (simultaneously on both sides of the probe) or equivalent method of sufficient force and frequency to keep the probe and lines sufficiently free of obstructions on at least a daily basis to prevent sensing interference, and (2) a means to detecting leaks in the system at least on a quarterly basis (a manual check is acceptable).

Design and equip each thermal flow monitor with a means to ensure on at least a daily basis that the probe remains sufficiently clean to prevent velocity sensing interference.

Design and equip each ultrasonic flow monitor with a means to ensure on at least a daily basis that the transceivers remain sufficiently clean (for example, backpurging the system) to prevent velocity sensing interference.

d. Recalibration

Adjust the calibration, at a minimum, whenever the daily calibration error exceeds the limits of the applicable performance specification for the $NO_x$ monitor, $O_2$ monitor or flow monitor. Repeat the calibration error test procedure following the adjustment or repair to demonstrate that the corrective actions were effective. Document the adjustments made.

e. Out-of-Control Period

An out-of-control period occurs when the calibration drift of an $NO_x$ concentration monitor exceeds 5.0 percent based upon the span range value, when the calibration drift of an $O_2$ monitor exceeds 1.0 percent $O_2$, or when the calibration drift of a flow monitor exceeds 6.0 percent based upon the span range value, which is twice the applicable specification. The out-of-control period begins with the hour of completion of the failed calibration drift test and ends with the hour of completion following an effective recalibration. Whenever the failed calibration, corrective action, and effective recalibration occur within the same hour, the hour is not out-of-control if 2 or more valid readings are obtained during that hour as required by Chapter 2, Subdivision B, Paragraph 5.

An out-of-control period also occurs whenever interference of a flow monitor is identified. The out-of-control period begins with the hour of the failed interference check and ends with the hour of completion of an interference check that is passed.

f. Data Recording

Record and tabulate all calibration error test data according to the month, day, clock-hour, and magnitude in ppm, DSCFH, and percent volume. Program monitors that automatically adjust data to the calibrated corrected calibration values (for example, microprocessor control) to record either: (1) the unadjusted concentration or flow rate measured in the calibration error test prior to resetting the calibration, or (2) the magnitude of any adjustment. Record the following applicable flow monitor interference check data: (1) sample line/sensing port pluggage, and (2) malfunction of each RTD, transceiver, or equivalent.

2. Semiannual Assessments

For each CEMS, perform the following assessments once semiannually thereafter, as specified below for the type of test. These semiannual assessments shall be completed within six months of the end of the calendar quarter in which the CEMS was last tested for certification purposes (initial and recertification) or within three months of the end of the calendar quarter in which the District sent notice of a provisional approval for a CEMS, whichever is later. Thereafter, the semiannual tests shall be completed within six months of the end of the calendar quarter in which the CEMS was last tested. For CEMS on bypass stacks/ducts, the assessments shall be performed once every two successive operating quarters in which the bypass stacks/ducts were operated. These tests shall be performed after the calendar quarter in which the CEMS was last tested as part of the CEMS certification, as specified below for the type of test.

Relative accuracy tests may be performed on an annual basis rather than on a semiannual basis if the relative accurac~~y~~ies during the previous audit for the $NO_X$ CEMS are 7.5 percent or less.

For CEMS on any stack or duct through which no emissions have passed in two or more successive quarters, the semiannual assessments must be performed within 14 operating days after emissions pass through the stack/duct.

a. Relative Accuracy Test Audit

Perform relative accuracy test audits and bias tests semiannually and no less than 4 months apart for each $NO_X$ pollutant concentration monitor, stack gas volumetric flow measurement systems, and the $NO_X$ emission rate measurement system in accordance with Chapter 2, Subdivision B, Paragraph 10, Chapter 2, Subdivision B, Paragraph 11, and Chapter 2, Subdivision B, Paragraph 12. For monitors on bypass stacks/ducts, perform relative accuracy test audits once every two successive bypass operating quarters in accordance with Paragraphs 2.B.10, 2.B.11, and 2.B.12.

b. Out-of-Control Period

An out-of-control period occurs under any of the following conditions: (1) The relative accuracy of an $NO_X$ pollutant concentration monitor or the $NO_X$ emission rate measurement system exceeds 20.0 percent; or (2) the relative accuracy of the flow rate monitor exceeds 15.0 percent. The out-of-control period begins with the hour of completion of the failed relative accuracy test audit and ends with the hour of completion of a satisfactory relative accuracy test audit.

Failure of the bias test results in the system or monitor being out-of-control. The out-of-control period begins with the hour of completion of the failed bias test audit and ends with the hour of completion of a satisfactory bias test.